

WHAT IS CLAIMED IS:

1. A projection type display apparatus
comprising:

5 a mirror array device having a plurality of
tiltable pixel mirrors each having a diffraction
grating on a surface to perform optical modulation by
the plurality of pixel mirrors;

an illumination optical system for illuminating
said mirror array device; and

10 a projecting optical system for projecting
reflected light from said mirror array device onto a
projected surface.

15 2. An apparatus according to claim 1, wherein
each pixel mirror is not tilted to display black on the
projected surface.

20 3. An apparatus according to claim 1, wherein the
tilt angle of each pixel mirror is maximized to display
black on the projected surface.

25 4. An apparatus according to claim 1, wherein
each pixel mirror is tilted by a predetermined angle to
do display black on the projected surface.

5. An apparatus according to claim 1, wherein
said projecting optical system has an aperture which

shields, of the reflected light components from said mirror array device, a light component which is not to be projected onto the projected surface.

5 6. An apparatus according to claim 1, wherein a color to be displayed on the projected surface is switched by changing a tilt angle of each pixel mirror.

10 7. An apparatus according to claim 1, wherein a color to be displayed on the projected surface is switched between red, green, and blue by changing the tilt angle of each pixel mirror.

15 8. An apparatus according to claim 1, wherein tilt angles of the pixel mirrors have a plurality of angle ranges that do not overlap, and a color of light to be projected onto the projected surface is switched by switching the angle range of the tilt angle.

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 9. An apparatus according to claim 1, wherein tilt angles of the pixel mirrors have first, second, third, and fourth angle ranges that do not overlap,

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 when the tilt angle falls within the first range, red is displayed on the projected surface, when the tilt angle falls within the second range,

green is displayed on the projected surface,

when the tilt angle falls within the third range,

blue is displayed on the projected surface, and

when the tilt angle falls within the fourth range,

5 black is displayed on the projected surface.

10 10. An apparatus according to claim 9, wherein
gray level display of each color is performed by
changing the tilt angle of each pixel mirror within the
first, second, or third angle ranges.

15 11. An apparatus according to claim 1, wherein
gray level display of each color is performed by
changing the tilt angle of each pixel mirror.

20 12. An apparatus according to claim 1, wherein
color display of one pixel is performed by mixing the
color light components from the pixel mirrors by time
color mixing.

25 13. An apparatus according to claim 1, wherein
color display of one pixel is performed by mixing the
color light components from the plurality of pixel
mirrors adjacent to each other.

14. An apparatus according to claim 1, wherein the
diffraction grating is an echelon grating.

15. An apparatus according to claim 1, wherein in a section perpendicular to a rotational axis in tilting the pixel mirror, the diffraction grating has a staircase shape.

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16. An apparatus according to claim 1, wherein a direction in which light diffracted by the pixel mirror is distributed and a tilt direction of the pixel mirror are in the same plane.

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17. An apparatus according to claim 1, wherein each diffracted light of each color is deflected in a separation direction of each color light component diffracted by the pixel mirror by tilting the pixel mirror.

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18. A mirror array device comprising a plurality of tiltable pixel mirrors each having a diffraction grating on a surface,

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wherein optical modulation is executed by said plurality of pixel mirrors.

19. A device according to claim 18, wherein the diffraction grating is an echelon grating.

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20. A device according to claim 18, wherein a direction in which light diffracted by said pixel

mirror is distributed and a tilt direction of said pixel mirror are in the same plane.

21. A device according to claim 18, wherein each
- 5 diffracted light of each color is deflected in a separation direction of each color light component diffracted by said pixel mirror by tilting the pixel mirror.

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